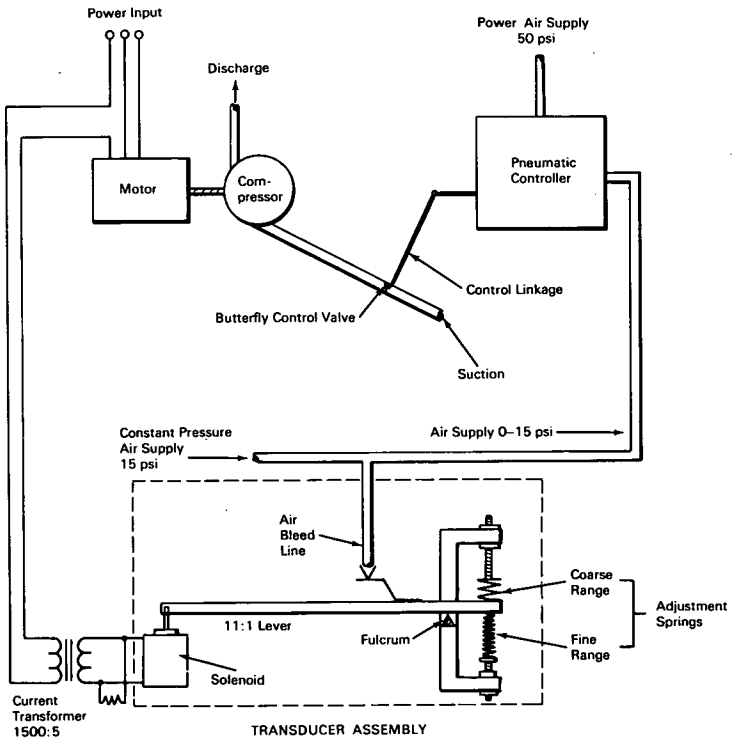
NASA TECH BRIEF

Electropneumatic Transducer Automatically Limits Motor Current



The problem:

To provide a device for limiting current input to an electric motor to a predetermined maximum by automatically adjusting the motor loading. A simple, efficient, and inexpensive method is required to limit the current input to an electric motor driving a centrifugal freon compressor in a water cooling system.

The solution:

A pneumatic controller regulates the load on the compressor, thus limiting motor input current. The pneumatic controller receives an air signal by means of an electromechanical transducer monitoring the motor input current.

How it's done:

The motor current controller consists of three sections, the motor/centrifugal compressor unit, the transducer assembly, and the pneumatic controller and associated linkage. The 1500:5 current transformer applies a current to the solenoid proportional to the input current of the motor. As the input current increases, the solenoid depresses the lever that causes a proportionate increase in the amount of air bled

(continued overleaf)

from the 15-psi air supply line. Thus an increase in current causes a decrease in the air signal applied to the pneumatic controller. Adjusting the coarse and fine springs sets the current operating point. The air signal from the transducer assembly controls the pneumatically operated damper which in turn limits the flow in the suction side of the compressor.

A rise in input current results in a drop in the air signal and causes the pneumatic controller to manipulate the butterfly valve to decrease the motor load. A decrease in input current produces a resulting increase in the motor load. Thus, the system provides an automatic control of motor current by means of adjustable motor loading.

Notes:

1. In the particular application described, a thermostatic control system was used in parallel with the current limiting device to provide temperature control. When the water temperature dropped below a specified minimum, the freon flow was reduced by means of a second signal applied to the pneumatic controller. Both control systems were connected to the pneumatic controller (in parallel) so that either could take precedence.
2. This controlling technique is simple and reliable and should be adaptable to systems other than compressor systems when the motor load is controllable.
3. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio, 44135
   Reference: B66-10160

Patent status:

No patent action is contemplated by NASA.

Source: Thomas F. Lovitt
(Lewis-253)